JPRS 78072

14 May 1981

West Europe Report

SCIENCE AND TECHNOLOGY

No. 59

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BIOTECHNOLOGY

BRIEFS

PRODUCTION OF INTERFERON--The Hoffmann-La Roche pharmaceutical company of Basel and Japan's largest producer of pharmaceuticals, Takeda Chemical Industries, have agreed to work jointly with the goal of introducing interferon in Japan, in connection with the Japanese Roche company, Nippon Roche KK. In its communique, the Roche Company states that the first clinical tests with leucocyte interferon have begun in the United States, following the successful production of interferon by Roche by means of geneticotechnical processes. Practical testing of interferon for cancer therapy was hindered up to now mainly because there were no industrial processing for producing interferon, and therefore the substance was not available in sufficient quantities. Nippon Roche will take up interferon research and development for Japan on the basis of recombinant DNA technology and will work closely with Takeda in this. [Text] [Zurich CHEMISCHE RUNDSCHAU in German 25 Feb 81 p 16] 5586

GUIDELINES FOR DNA WORK -- Amsterdam, 1 April -- The building of the special DNA laboratory of the TNO [Netherlands Central Organization for Applied Natural Scientific Research] near Rijswijk is not necessary. Because of the new directives for recombinant DNA research, published yesterday, whereby the DNA molecule is used to try to alter the hereditary characteristics of bacteria, it will be possible for most DNA research in the Netherlands to be conducted in rather ordinary laboratories. The special so-called C3-laboratory is 5 years too late. That is the opinion of Amsterdam Professor Dr Piet Borst, one of the most prominent DNA researchers in the Netherlands. Borst: "Who still wants to conduct C3-tests? We do not, and neither does industry. As a matter of fact, all DNA research being done in the Netherlands can be done at the C1-level." The new directives for DNA research published yesterday make it possible for most DNA research (specifically, experimenting with the intestinal bacterium E coli) to take place in so-called C1-laboratories. These are laboratories with ordinary hygiene regulations -- comparable to those of hospitals. At the present time, it is possible to conduct this C1-research in six laboratories in the Netherlands. In addition, there are six so-called C2-laboratories, in which ordinary C1-research can also be done, and a C3-space is being set up near Rijswijk (TNO) for more risky tests. [Text] [Rotterdam NRC HANDELSBLAD in Dutch 1 Apr 81 p 1] 8463

CSO: 3102/237

ACTIVITIES OF AGENCY FOR DATA PROCESSING DESCRIBED

Paris INDUSTRIES & TECHNIQUES in French 1 Mar 81 p 12

[Article by Jacques Houbart: "Computerization: An Agency Attuned to Its Users"]

[Text] Subordinate everything to the needs of the the users while identifying common denominators to avoid scattering of effort: This is the guiding principle the ADI [Agency for Data Processing]* has set for itself. It is an innovative approach in the technocratic world, and, to judge from initial results, everyone partaking of it gains from it.

On 6 September 1978, the government announced the creation of the ADI. Would it just be one more technocratic outcrop? By the end of its first year in operation, no doubt remained that it was responding to a real need for coordination and advice during this period of rapid computerization throughout the country.

Its chairman, Bernard Lorimy, has in fact made of it an innovative example of "supportive leadership." In clear terms, whether it is counseling research or helping to equip, its first and foremost concern is the needs of the user. More than 200 agreements are in the course of being implemented and some 200 more are in the course of being worked out with groups of users or with the most diverse types of organizations. The ADI will have at its disposal in 1981 over Fr 300 million to carry out its functions. The sum appears appreciable. It is modest, however, if one compares it with the incentive effort being deployed by the Japanese government.

The ADI's "sectoral approach" seeks to resolve the problems of computerization by proposing to as large groups of users as possible the use of common solutions. One of its main objectives is to economize software by developing it just once for a large number of users. The resulting individual costs are not negligible, but the overall benefit is substantial. From the standpoint of the designers, the costs of doing business are reduced to their simplest terms. From the standpoint of the users, they pay only once for the right of usage when its development is financed through a professionwide investment. Initial cases of this approach show that the costs, roughly speaking, are halved.

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* (Agence de l'Informatique, Tour Fiat, cedex 16 92084, Paris la Defense 796.43.21) and 7 regional offices.

There is also a savings in equipment to the extent that a group of users can negotiate a groupwide agreement with the builder, obtaining more favorable terms. As for the supplier, he distributes his products and associated software more easily over a much larger and homogeneous market. To cite a few examples: Agreements have been struck with the mirror and glass works industry (1,000 enterprises involved), with the construction metals industries syndicate (2,400 enterprises), and the national metal cutting and stamping syndicate (1,000 enterprises). In the case of the latter, a training program in computer-aided operations is being carried out. The latter could act like an oil spill throughout the groups belonging to the Federation of Mechanical and Metalworking Industries (66 group syndicates).

A substantial effort is also being deployed to assist individual enterprises in computerizing their processes. Of 120 applications for subsidies, 38 have been selected to receive a total of Fr 15.55 million. Among the principal sectors concerned are the food farming, the electrical, the mechanical and the textile industry sectors. The ADI may also counsel the computerization of an individual firm "when the use to be made of it warrants being aided because of its innovative or exemplary nature." In a way, the ADI operates as a super-SSCI [Data Processing Services and Consultant Company]. It is easy to imagine that when the ADI's diverse functions have reached their full development, the true SSCI's will, in one way or another, have associated themselves with this vast movement.

Lastly, from the standpoint of research, the ADI has taken over the management of the INRIA [National Institute for Research in Data Processing and Automation] projects, which are now beginning to bear fruit abundantly: "SURF" in the domain of reliability of operation of data processing systems; "SIRIUS" (operation of time-sharing data banks), "KAYAK" (bureaucratic); "SOL" (software); and "NADIR" (use of satellite data processing).

9399
CSO: 3102/202

ELECTRONICS

BRIEFS

MICROELECTRONICS RESEARCH--Grenoble--The "Norbert Segard" Microelectronics center, located near Grenoble, was inaugurated on 24 February by Mr Pierre Ribes, secretary of state for PTT. It is a center for research on electronic components, set up by the CNET [National Center for Telecommunications Studies] under the government plan to close the French integrated-circuit gap. French production in the electronic circuits field represents in fact only 2 percent of world production. This center, however, will not be devoted to the production of circuits but rather to research on electronic components, with the object of conveying its technological know-how to industrial firms. It currently employs 160 persons, and will have around 230 employees by the end of the year. A second developmental phase of this CNET arm at Grenoble has been decided, which will bring the total current staff to some 500 persons in about 3 years. Telecommunications and technologies, which it is estimated will include the deployment of telematics, should consume around 15 million integrated circuits a year by 1986. [Text] [Paris AFP SCIENCES in French 26 Feb 81 p 7] 9399

CSO: 3102/198

ALTERNATE SCENARIO FOR ENERGY POLICY PRESENTED

Amstelveen ENERGIE SPECTRUM in Dutch Mar 81 p 59

[Letter on energy policy sent by minister of economic affairs to House of Representatives]

> [Text] The minister of economic affairs has sent a letter to the House concerning the development of an "alternate" energy scenario. This scenario will be developed by the Center for Energy Conservation [CvE] in Rotterdam, following the lines set down in the recommendation of the temporary General Energy Council [AER] concerning energy scenarios. The text of the letter follows.

On 21 April 1980, I asked the temporary General Energy Council to make a recommendation to me concerning the desire, which has been expressed on many sides, that other scenarios besides the scenarios in Part I of the Energy Policy Memorandum be considered. I sent you the recommendation of the AER, the main text of which was sent to me on 18 June 1980 and the appendices on 27 June 1980, by letter on 29 July 1980 (House document No 15802, No 15). In this recommendation, the AER suggests that, in addition to adjusting the scenarios from Part I of the Energy Policy Memorandum, a single alternative scenario also be developed and that the Center for Energy Conservation in Rotterdam be involved in this.

Consultations with the CvE, resulting from this recommendation, have currently been completed and have led to a contract with the CvE to draw up an alternative scenario and to establish an advisory committee in conformity with the recommendations of the AER.

Based on this, I have set aside a maximum sum of 1.6 million guilders for activities in this area. From this sum I have first of all allocated 0.6 million guilders to the CvE, in order to enable the CvE to develop an alternative scenario prior to 1 May 1981, as per the appendices of the AER recommendations. This will, at the same time, enable the CvE to prepare a proposal for a follow up study on which a decision will be made prior to 1 July 1981.

I have proceeded with the establishment of an advisory committee with a mission as specified in the AER recommendation. I will have the decision to establish this advisory committee published in the official gazette. As soon as progress in setting up the new scenarios warrants it, I will give you further information on this.

8463
CSO: 3102/237

ENERGY

LARGEST WIND TURBINE IN COUNTRY ERECTED

Amstelveen ENERGIE SPECTRUM in Dutch Mar 81 pp 58-59

[Article: "Largest Wind Turbine in the Netherlands Erected on ECN Property"]

[Text] On Thursday morning, 12 February, on the property of the Netherlands Energy Research Center [ECN] in Petten, the generator pod of Netherlands' largest wind turbine, weighing 40 tons, together with the blades, each 12.5 meters in length, were raised into position.

The design, building and testing of the turbine are a part of the government's subsidized National Research Program on Wind Energy. This program is aimed, on the one hand, at the application of wind energy to the national production of electricity and, on the other hand, at such decentralized applications as enterprises, residential areas, the drainage of polders, greenhouses, etcetera.

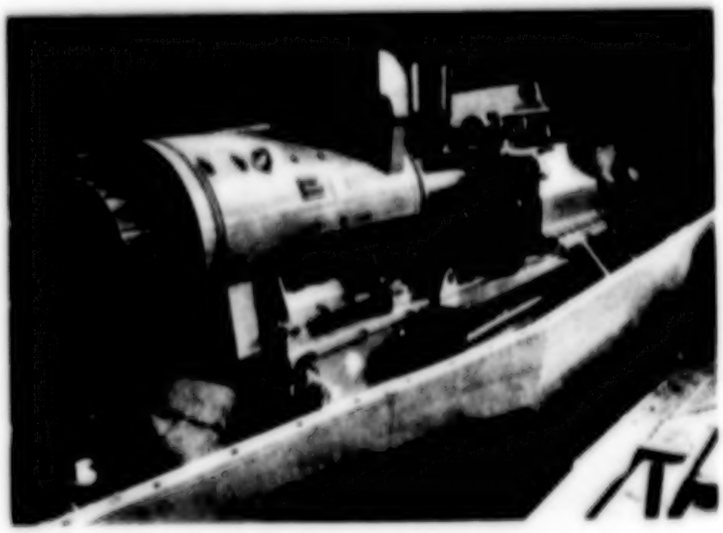

Fig. 1. The opened pod at FDO in Amsterdam. In the foreground, the 300 kW direct current generator

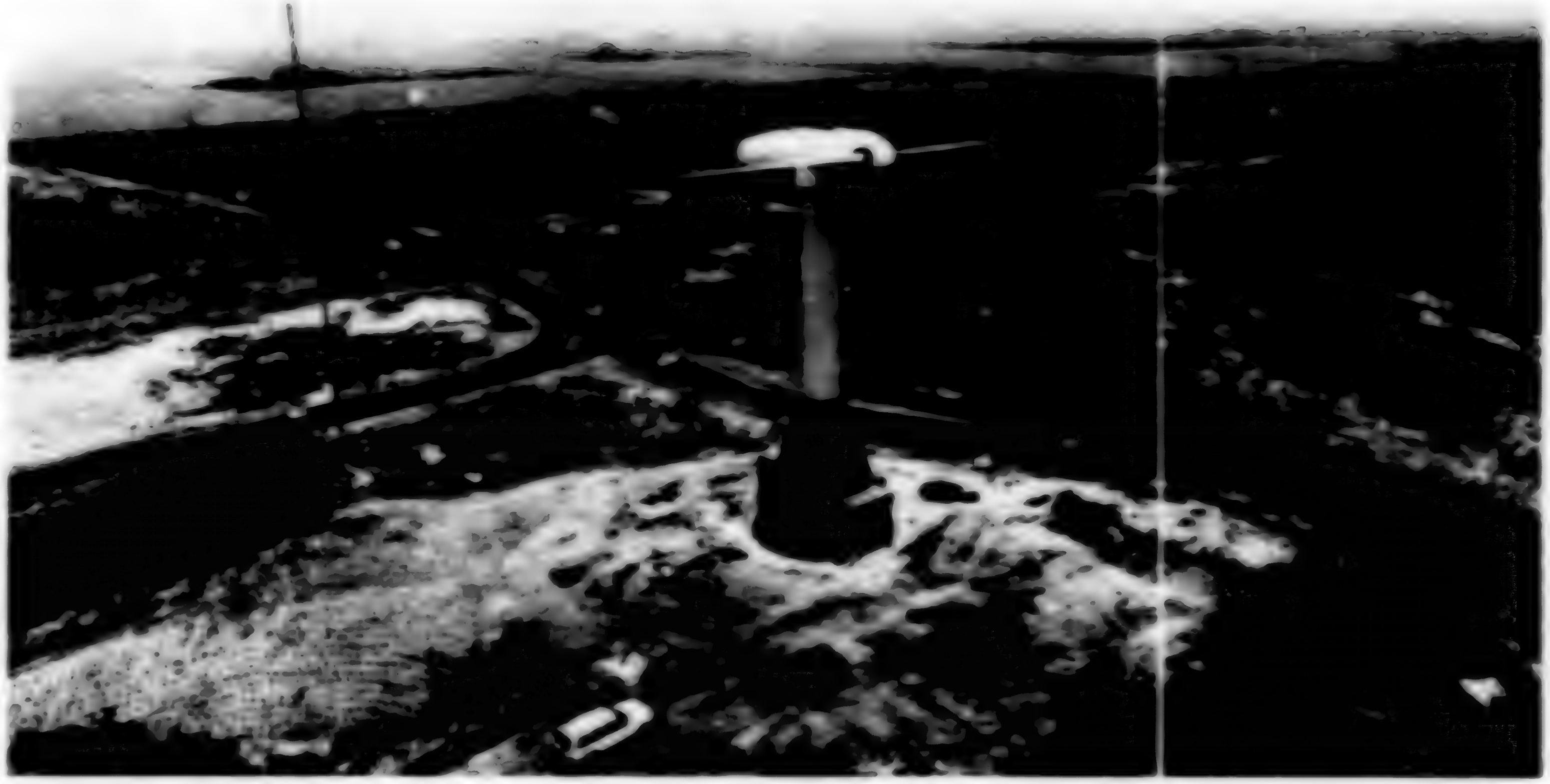

Fig. 2. The 22 meter high wind turbine in the dune landscape.

The wind turbine was built under the supervision of the FDO [expansion unknown] (a subsidiary of VMF [expansion unknown] -Stork) in Amsterdam; the generator pod and the blades were transported from Amsterdam to Petten by ship, via the Noord Holland Canal.

Following the final erection and the accompanying inspection of the measuring and regulating systems, the first tests will take place. The wind turbine will serve primarily to test parts and materials for future large wind turbines under "Dutch" conditions. The rotor of the wind turbine has a diameter of 25 meters; the output of the generator will be 300 kW. The generated electricity will be delivered to the public electricity networks.

[illegible]
CSO: 3102/237

INTERNATIONAL SYMPOSIUM ON WIND ENERGY SYSTEMS REVIEWED

Duesseldorf BWK: BRENNSTOFF-WAERME-KRAFT in German Jan 81 pp 32-34

[Article by Dr. A. Fritzsche, Markdorf, and A.Vollan, Hagnau: "International Symposium on Wind Energy Systems in Copenhagen from 26 -28 August, 1980." Presentations were compiled and made available at the symposium.]

[Excerpts] The third symposium on wind energy systems sponsored by the British Hydromechanics Research Association (BHRA), England, was held in Copenhagen, Denmark, this year in cooperation with the Technical University of Denmark. In 1976, the first symposium was held in Cambridge(1), and the second symposium was held in Amsterdam(2) in 1978. The claim of internationalism was not fully achieved with regard to information on national programs and representation of nations interested in the usage of wind energy. The circle of participants did increase for the second time by 35 percent; nevertheless, at this third symposium on wind energy systems non-European participation constituted less thatn 15 percent and was thus underrepresented. Among the Europeans, Scandinavia was dominant with a group participation of 40 percent. Was it then a symposium for the presentation of Scandinavian activities? No; with 10 of 41 presentations Great Britain dominated, the country of the sponsors, followed by the United States of America, Sweden and Denmark. The minor participation of the FRG was hardly to be explained by the short period of time elapsed since the second Seminar on Wind Energy (Third International Sun Forum) of the Ministry of Research and Development in Hamburg in June, but rather by an intentional reservation, or at least a moderate interest in the exchange of information.

Even in the specialized field of wind energy it is beyond the point that the results of theoretical and experimental research can be presented and discussed at a symposium and at the same time the need for information of the interested public, of energy management and of the group of potential plant operators in the industrialized and the developing nations taken into account. Representation of the developing nations was even less than 2 years ago; more than half of the participants came from government institutions, universities, consulting firms and from the press; less than half came from industry.

The 41 presentations were divided into the following topics according to tradition:

-- Projects of national scale

-- Wind supply and site issues

-- Design, Manufacture and operation results

-- Designs with horizontal rotating axis

-- Designs with vertical rotating axis

-- Composite plants and tracking flows

-- Utilisation of small plants

-- Wind energy systems in connection with the electrical system.

The national wind energy program of the host country, Denmark, was not presented in one comprehensive presentation. It became clear from several presentations, information material provided, a visit to the Danish small-plant test fields and the two 630-kW plants in Nibe, that in Denmark wind energy utilisation is a market for the industry and a directly accessible source of energy for the utility companies and final customers. A directory of plant and component manufacturers encompasses 25 firms. The listed nominal outputs range up to 50kW; larger plants are in the process of being developed. It is interesting to note that all but one manufacturer are comitted to the tradition of the Gedser wind mill, i.e. the 3-blade rotor. Roughly 500 plants are in operation in Denmark, 300 of them within the electrical system.

The test field in Risoe on the Roskilde Fjord is part of the research and development program financed by the Ministry of energy. The performance and structural-dynamic data are measured in plants with horizontal, inclined and vertical rotating axes (Darrieus and Gyromill designs). The manufacturers receive free consulting, suggestions for improvement, and cost analyses supplement the measurement program.

A law in Denmark which regulates the details of tying small power plants up to 500 kW into the public electrical system went into effect in November of 1979. The validity of this law, to some extent an experiment, is for the time being limited to the period from 1 January 1980 to 31 December 1982. The fixing of the price for surplus energy by plant operators is based on the consideration that utility companies can at best only pay what they save on their costs due to the energy feed-in. Ten percent is added to the production costs in the power plant in order to take into account the savings on the cost of distribution. It is not expected that the number and total output of the small plants will influence the growth in capacity of power plants in the coming years.

The main part of the Danish research and development program is comprised of the NIBE-A project. The trial runs for the NIBE-A plant were started in the summer of 1979 and those of NIBE-B in April of 1980. Differences in construction designs lie mainly in the shape of the blades. Both are three-blade rotors (here, too, based on the Gedser model), in which one features a four-stage adjustment of the outer portion of the blades, while the other is based on the whole-length, steady-blade concept. The cost of the third blade is looked upon as relatively low, taking into account the cost of the whole rotor. The nominal output (630 kW), the generator and rotor rpm, along with the tower design of both plants, are the same.

Two English contributions to this group of presentations dealt with the use of wind energy in offshore areas. It was ascertained that plants with a minimum distance of 7 km from the coast, erected in water of an average depth of 15 m, would not present any insurmountable technical difficulties. For a network arrangement of 200 plants with 80-m diameter rotors, electricity-generating costs of 5.1 p/kWh are assumed under certain conditions. Even for larger, relatively cost-efficient plants this value still exceeds the cost of conventionally provided energy by factor 2 up to the year 2000.

Plants With Horizontal and Vertical Rotating Axes.

The Karman Aerospace Corporation developed, built and tested a fiberglass-constructed, 46-m rotor blade. The main purpose of this project is the development of a technology to produce cost-efficient, composite-construction rotor blades. Without the distribution of developing and tooling costs, production costs of $22/kg were incurred for the prototype. Of the total weight of the blade (16 tons), the composite structure accounts for 64 percent. Costs of $9/kg are expected in series production. Calculating with these figures further and assuming an output of 3MW, with a 92-m diameter rotor, expected plant costs of $800/kW and a weight of 32 tons for both blades, their specific costs would be $100/kW or less thatn 15 percent of the total plant costs. Although this is not the proportion for the complete rotor, this value lies far below the commonly quoted scale of 35 to 40 percent.

Two German presentations dealt with the design and construction preparations for the blades of a 265-kW plant with Voith. As already depicted elsewhere (3), the fast rpm value of 16, selected for the design point (the ratio of circumference speed at the tip of the blade and of wind velocity) results in an extraordinarily thin blade (25 m long). In spite of the relationship of blade area to weight, this amounts to only 65 kg/m^2 (1.1 tons total weight) as compared to 150 kg/m^2 in the Karman Aerospace design. The reason for this is the use of carbonfiber-composite technology for the supporting parts of the blade.

The important aspects of safety and supervision were dealt with in a presentation by the University of Exeter and the Central Research Laboratories, U.K. Fatigue tests in order to determine the accuracy of the expected life of large elements, are extraordinarily time-consuming and cost-intensive on the original scale. The calculatory proof of the safe life remains an estimate. The combination of a structural design according to the principle of sequential damages minimalization, damage tolerance maximization and supervision of the structure in operation promises low costs and satisfactory operational safety.

Although the Swedish national wind energy program was not presented comprehensively, several technical presentations showed, as was the case in Amsterdam in 1978 (2), diligent planning by the Swedish Board for Energy Source Development. Without reaching the DOE budget, the program can be broken up into the development of the aerodynamic and structural-aerodynamic bases, design, construction and testing of plants in the medium and upper output range, and studies on new, still unusual concepts.

It can be assumed from design details of the WTS 3 wind turbine system with a 3 MW nominal output--a project of the Swedish Karlskronavarvet Division of Hamilton Standard, U.S.A.-- that a relatively conservative concept was preferred in order to gain experience quickly and solve basic problems. WTS 3 is a plant with a horizontal rotating axis, a 78-m rotor diameter and blades of fiberglass-reinforced plastic and hydraulic blade adjustment. In order to keep the shock loads on the rotor and drive shaft as low as possible, a torsion-flexible suspension of the transmission was provided for, in addition to the flexible rotor suspension (flexible hub). In spite of an increase in electrical controls, the use of a synchronous generator promises more relevant test results with regard to operation within the electrical system in the future.

When introducing the concept of a 20-MW plant with a vertical rotating axis for offshore applications, O. Ljungstroem also supplied some data on the development of the Swedish energy situation. If all land areas suitable for wind energy utilization were equipped with plants, 10 TWh/a could be won. On the basis of the studies, 20 to 30 TWh/a are to be expected from the offshore areas. Assuming an increase in current electrical energy consumption from 95 TWh/a to 125-135 TWh/a around the year 2000, wind energy could supply approximately 25 percent of electrical or 6-8 percent of the total energy demand (500 TWh/a).

According to initial estimates of this study, offshore plants are appraised cost-effective ($750/kW). The concept of a plant according to the Darrieus principle (180-m rotor diameter, 210-m rotor height) has characteristics which, in the opinion of the speaker, could constitute the basis for mastering the structural problems of very large plants or a chance to expand the output range beyond 10 MW/unit. Free of losses caused by the Reynolds number, an impact when dealing with small construction sizes, which L. Leech, University of Birmingham, U.K., dealt with, regidity and weight requirements can be met with large dimensions and a double blade, maintaining the same aerodynamic properties. The L-shaped arrangement of the two double blades, in relation to the rotor axis, is advantageous with regard to the periodic aerodynamic loads and the uniform torque, yet requires additional measures of balancing the rotor rotating on a large pedestal and not supported by bracing.

Wind Energy Systems Within the Electrical System.

In conclusion, let us point out an area which will certainly be examined from a technical and energy management viewpoint.

As long as no efficient and cost-effective storage technology is available, it seems reasonable to reduce the supply safety of power plants fed by regenerative energy sources, e.g. sun and wind, by coupling two nonconventional energy sources and one conventional energy source. In the evaluation of bivalent or even trivalent energy systems site, output range and network size play an important role.

One presentation dealt with the issues of operating cost and amortization of an autonomous energy system, consisting of 100 kW of solar-thermal and 400 kW of wind energy capacity for substitution of a diesel-electric power plant. According to this calculation, the cost of saved diesel fuel are supposed to pay off within 10 years. It would be conceivable that for the operator the bivalent system of a diesel-supported wind energy plant would be of more interest initially.

The combination electrical system of wind energy systems and water power plants was addressed by Soerensen of the University of Copenhagen in his study, which could serve as a starting point for similar studies in other geographic areas. He bases his study on the assumption that the Norwegian network fed by water power exclusively is coupled with the Danish network, and the entire Danish electricity requirements are met by wind energy. He arrives at the conclusion that, with a ratio of 0.3:1 of Danish versus Norwegian electricity requirements, the impact of coupling wind energy with the electrical system on the filling of Norwegian reservoirs calculated for a 9-year period will remain low. The average value deviates about 3 percent from the standard value; extreme values are at -5.5/+11 percent.

Between 31 and 47 percent of Danish requirements would be met by Norway, and between 11 and 18 percent of Norwegian requirements would be met by Denmark. Under mean conditions, wind energy would upply 23.5 TWh/a; of those, 57 percent go to Danish and

38 percent to Norwegian consumers, with a 5 percent transmission loss. The losses from the energy flow in both directions would amount to 9 percent. The efficiency of a competitive storage system of another type then would have to be a minimum of 90 percent, assuming equally rapid load changes.

Final conclusion.

Even a more complete report on the Copenhagen symposium would not provide an overview of the worldwide activities in the area of wind energy utilization. Canada's program, for instance, which was reported on 2 years ago in Amsterdam, was not mentioned this time. Except for some program reports, the increasing variety of topics was reflected in the presentation of detailed studies. More attention should be focused on the energy-management aspect, which may be represented at the next symposium 2 years from now with some utility companies supplying operating experience, and a synoptic treatment of technical problem areas. It remains to be seen what the technical impact of the German program will be due to the fact that the commissioning of the first MW plant is not scheduled until 1982 and the output range between 500 kW and 3 MW has not been covered so far. Even in today's areas of concentration, major problems remain to be solved, if the task of energy provision from non-conventional primary energy sources in the third world nations is included. The provision of calculation procedures to detect non-stationary operating condition, meteorological and plant-related measuring and control systems, the development of bivalent cost-effective energy supply plants and the provision of cooperative transfer of knowhow are subjects which could be studied in coordination with other programs of the FRG and produce long-term results.

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9544
CSO: 3102/163

ENERGY

RUHRKOHLE DISCUSSES COAL CONVERSION PLANS

Bonn DIE WELT in German 17 Mar 81 p 12

[Article by Volker Fuessmann: "The First Oil From Coal Will Flow at Bottrop Next Summer"]

[Text] The starting shot is expected to be fired in July: "coal in" [in English] in the biggest German test installation for coal liquefaction at Bottrop. Each day, 200 metric tons of hard coal will be converted to unrefined gasoline, medium oil and gas in the Welheimer Mark. The installation is developed, designed, constructed and operated by Ruhrkohle AG [Ruhr Coal, Inc.] and Veba Oel AG [Veba Oil, Inc.]. The investment project, which is worth DM 200 million, is supported decisively by the economics ministry of the Land of North Rhine-Westphalia.

However, Bottrop is not the only installation for direct liquefaction of coal. Starting with the middle of this year, the second German "trial balloon" for catalytic hard coal hydrogenation will rise at the Saarbergwerke AG [Saar Mines, Inc.] in Voelklingen, and in the United States Ruhrkohle AG also has a small share in three further projects for direct liquefaction of coal. Why then still another test installation at Bottrop? DIE WELT discussed this at Bottrop with Ruhrkohle Oel and Gas GmbH [Ruhr Coal Oil & Gas, Ltd.], which handles the projects for Ruhrkohle AG.

WELT: Hard coal liquefaction has been carried out on an industrial scale since the mid-1950's by the South African Coal Oil and Gas Company (Sasol). And, reportedly, with success. What then is different at Bottrop from other installations for coal liquefaction?

Ruhrkohle Oel and Gas: Liquid products from coal can be obtained in two ways: first, by means of the Fischer/Tropsch process, i.e. coal is liquefied via the detour of gasification, and second, by direct hydrogenation. Now our point of view is that the route of direct liquefaction is in the long term the most economical way to convert coal into light and medium oil. In South Africa they are taking the first route, i.e. they gasify coal by means of a technically improved Fischer/Tropsch process and they subsequently liquefy the intermediate products. This is considerably less economical, but in Sasol's case economy plays a subordinate role because there the cost of the coal charged is practically nil. We do not have this advantage. Our coal is expensive; consequently, we have to get the maximum out of it in a technical way.

WELT: How long have preparations been going on for the Bottrop project?

Ruhrkohle Oel and Gas: Design of the Bottrop oil-from-coal installation was initiated in 1977 after it was ascertained that the Land of North Rhine Westphalia would decisively support eht project. In 1978, Veba Oel AG, a firm experienced in processing, became a project partner. Veba Oel set up a technical school on its land in Scholven which will work on the further processing of oil from coal from the Bottrop installation.

WELT: For what time period are the tests at Bottrop scheduled?

Ruhrkohle Oel and Gas: A 3-year operating period is assured financially by state subsidies. However, we want to draw the tests out over a longer time period.

WELT: Approximately 5 years after Bottrop, according to present planning concepts, a demonstration plant is to be set up as a preliminary step for industrial use. What is the concept for an installation of this nature?

Ruhrkohle Oel and Gas: All planning documents for a large-scale installation are at present with the Land government in Duesseldorf. We assume that start-up of the first construction stage of the "large-scale Ruhr oil-from-coal installation" cannot be counted on before 1986. In accordance with the planning order of the Land of North Rhine-Westphalia, it will have an annual throughput of 6 million metric tons of hard coal, i.e. four hydrogenation trains of 1.5 million metric tons capacity each. For German conditions this is considered to be the maximum size, because a good mine has a production capacity of 3-4 million metric tons a year. Consequently, two good-sized producing mining operations are needed close to the plant site.

WELT: Six million metric tons of hydrogentated coal. What is produced from this in the end?

Ruhrkohle Oel and Gas: From 6 million metric tons of liquefied hard coal we can obtain: 1 million metric tons of crude naphtha (raw material for gasoline), 2 million metric tons of medium oil (raw material for heating oil), 0.6 million metric ton of liquefied gas and 2 million metric tons of SNG (synthetic natural gas).

WELT: Relative to the cost of German hard coal, how expensive or how cheap is the industrial production cost of a liter of gasoline from coal?

Ruhrkohle Oel and Gas: Production costs for gasoline from coal can be less than the present service station price, i.e. approximately 80 pfennigs to 1 mark, without the tax portion of course.

WELT: Has the location for the large-size installation definitely been set?

Ruhrkohle Oel and Gas: No, a final decision has not been made. Although we have investigated 20 sites in the proximity of the Ruhr area, fewer than five have proved to be suitable.

WELT: Bottrop is not the only piano on which German hard coal is playing currently...

Ruhrkohle Oel and Gas: That is correct. In order to have access to American developments in the area of coal hydrogenation, Ruhrkohle AG, with the support of the Federal Ministry for Research and Technology and the Land of North Rhine Westphalia, has acquired participating interests in American large-scale tests, namely for projects of the U.S. firms Gulf, Exxon and Hydrocarbons. This has several advantages. Two of the most important are: increased experience through testing alternate processes, and we are aboard if one of these developments is commercially successful.

WELT: Ruhrkohle AG since 1974 has also participated in the design of a 6,000 metric ton demonstration plant at Morgantown, Virginia [as printed], which is to operate in accordance with the SRC process (hydrogenating coal extration)...

Ruhrkohle Oel and Gas: The Morgantown project is in the engineering phase at present. The installation is designed for an initial capacity of 6,000 metric tons of coal a day. Thanks to the planned modular method of construction, it is possible to extend Morgantown to produce up to 30,000 metric tons a day, and it is only from this point on that industrial coal liquefaction properly starts.

3586
SO: 3102/231

ENERGY

BRIEFS

BRITISH SOLAR POWER PLANT--Lucas-BP Solar Systems, Ltd., a subsidiary of British Petroleum and the Lucas electrical equipment firm, is going to build a solar power plant at Marchwood, near Southampton, which will cost 1.25 million pounds. (One third of the financing is being provided by the European Commission.) This power plant will be connected to the national electrical network. The Lucas firm is also participating in other solar energy based construction: telephone network in Columbia, lighting of detached buildings in Sri Lanka, and railway signaling in Australia and Canada. [Text] [Paris SEMAINE DE L'ENERGIE in French 9 Mar 81 p 12] 11706

CSO: 3102/226

INDUSTRIAL TECHNOLOGY

COATING GIVES MATERIALS NEW SURFACE CHARACTERISTICS

Vacuum Deposition

Stockholm NY TEKNIK in Swedish 5 Mar 81 pp 18-19

[Article by Hans Werner]

> [Text] Vacuum deposition of various substances, primarily on metal surfaces, gives these surfaces tailor-made properties. It is possible to deposit corrosion-resistant surfaces on high-alloy steel, aluminize grids for flores-ent lamp fittings, and deposit surfaces onto polymer material.
>
> Polycarbonate, a material used for car and bank windows, can be given a scratch-resistant surface.
>
> Experiments with vacuum deposition are underway at the Linkoping Technical University in cooperation with industry and with the support of STU (Board of Technical Development).

In cooperation with a number of Swedish industries, experiments are underway at theLinkoping Technical University with vacuum deposition, among other things, of metals onto metal surfaces. The result is tailor-made properties on the surfaces. One promising project is attempting to deposit surface layers onto high-alloy steel to resist high temperature corrosion.

The experiments are part of a 3 year research project, which is also to be applied toward thedoctoral degrees of civil engineers Bengt Andersson and Hans Hentzell. With the cooperation of Professor Torsten Ericsson at the Institute for Construction and Production Technology of the Linkoping Technical University and with the support of STU, experiments are being carried out that now also include testing in industry. It is primarily Stal-Laval, Sandvik, and FFV that have a natural interest in the development of this process.

Oxygen Provides Ceramic Layer

Their experiments begin by placing an alloy of Fe, Cr, Al, and Y into water-cooled copper crucibles in a vacuum chamber. Samples of high-alloy steel (31 Ni 21 Cr, Fe) are placed above it. A little oxygen gas is present and the result is a metal oxide ceramic layer. By way of comparison, vaporization is also carried out without oxygen present.

The surfaces that are to be coated in the chamber must be clean and free of grease. The chamber is evacuated down to 10^{-4} Pa. Then the samples are heated to above 500°C to increase adhesion.

The charge in the copper crucibles is heated using electron guns. The beams are guided by magnetic fields in such a way that the center of the charge is heated to between 1,500 and 2,000°C. The vaporized material can travel around 20 meters. Thus, it can be deposited on the sample, which occurs with a layer thickness up to 50 micrometers. It is this layer, condensed on the sample, that reveals such remarkable properties.

This environmentally safe method is already being used in some industries, for example for optical applications and for aluminizing grids for florescent lamp fittings. Some industries (abroad) are using electron guns with up to 250 kW of power output. The material to be coated can be heated by electron beams of IR lamps.

Here in Sweden there has been great progress in the coating of polymer materials. For 2 years Fil. Mag. Johan Nordlander and civil engineer Peter Bodo have been working in this area. On commission by LM Ericsson, they have developed a method for vacuum coating cooper onto a special epoxy plastic for use in the production of printed circuit cards.

They are also part of the project involving KemaNord and STU, the purpose of which is to produce a scratch-resistant surface on polycarbonate, suitable for automobile and bank windows (NY TEKNIK 1981:3).

According to the researchers in Linkoping, cathode vaporization (so-called sputtering) or ion plating can be used in addition to vacuum vaporization. Another interesting coating method is plasma spraying. With this technology, diamong-like carbon films can be produced.

The main problem today is that precise knowledge of the conditions necessary for successful results using these methods is lacking. For this reason, many Swedes are studying them. It is this precise knowledge that the Linkoping researchers and others are now seeking.

Promising Al Coating

Simple oxidation tests demonstrate that the Linkoping Technical University group's method of varying the oxygen and aluminum contents in metal oxide ceramic coatings on high-alloy steel is promising.

Some industries are currently studying the combined mechanical properties of the layer and the base material. The most important work involves creep tests at 900°C, with comparisons to uncoated steel.

The tests are run until the creep results in a fracture. Then the layer is examined closely. Powerful new equipment for this purpose is available in Linkoping.

The main interest of the surface coating study group--a total of nine persons under the leadership of Professor Sven-Erik Karlsson--here at the Department of Physics and Measurement Technology in Linkoping is in the areas of alloy vacuum deposition, sputtering, and the surface coating of polymer materials.

For example, the purpose of the reactive sputtering of titanium in atmospheres of methane, nitrogen, and oxygen is to study the process. The applications are many and are of current interest, including

producing wear-resistant layers;

making decorative surface layers that shine like gold (TiN shines like gold);

producing material for solar absorbers to be used at high temperatures.

This can also be done with polymer materials to produce surface properties that cannot be achieved by other methods.

Amorphous Surfaces

Another remarkable type of material that can be produced by surface coating under a vacuum is amorphous structures. Metals are normally crystalline. The three-dimensional periodic structure is responsible for such properties as electric conduction and dislocation deformation. (Small improperly placed atoms cause "earthquakes" in the crystalline material.)

It has been discovered in recent years that certain metal alloys can be produced with an entirely disorganized structure (amorphous or glass) through very rapid solidification from the melt, or by way of another process in which the metal condenses rapidly. This is the case during vacuum deposition.

These materials have unique magnetic, superconducting, and mechanical properties with a number of potential applications. This can be achieved by surface coating using vacuum deposition, sputtering, or ion plating.

New Construction Material

The Linkoping group has begun experiments to produce layers with an amorphous structure. They are investigating the crystal structure, electrical and magnetic properties, and the thermal stability of the layers. The purpose is to determine under what conditions amorphous material can be produced and to discover its properties.

The costs of coating with these methods (PVD Physical Vapor Deposition) are often approximately the same as coating by conventional methods. So far, the largest fields of application have been aluminum coating of plastics, thin film microelectronics, and in the optical industry. Coated turbine blades and airplane components are other applications.

Often, coatings of several different materials on one another can be made in one and the same process cycle. The coating rate is dependent on the material that is to be deposited. With vacuum deposition 75 micrometers per minute can be achieved, 25 using ion plating, and 0.01 to 1 with sputtering.

East German Cans

Adhesion can be improved by using argon etching before surface coating. It is also quite easy, for example, to run sheet iron through the vaporization chamber to be coated with aluminum.

This is done in East Germany during the processing of sheet metal for cans at a rate of 3 meters per second. The 2.5 to 3 micrometer thick coating remains free of pores even when the metal is bent and shaped into the form of a can. The starting material is 40 cm wide sheet iron.

In Swedish industry, these methods will now be used, for example, to produce turbine blades and heat exchangers for reusing waste heat.

Surface Physics, Chemistry Studied

Stockholm NY TEKNIK in Swedish 5 Mar 81 p 19

[Text] The physics and chemistry of surfaces is an area in which the Board for Technical Development, STU, has now begun to invest heavily. This is perhaps the most basic research oriented STU program ever, but it is hoped that there will be a rapid increase in applications to meet the daily needs of industry.

Primarily, the plans include the study of surface modification and surface structures, which are of great interest, for example, in the automobile and engineering industries. Coromant was responsible for the first industrial application of surface modification in Sweden. Now new methods have been developed.

The plan will also include, on the chemical side, the study of catalysis, which is being studied especially intensely in Lund.

Finally, the study of corrosion is a natural and practical aspect of the program.

This new program has been in operation since 1 February. In terms of money, the 5 year program will cost around 3 million kronor per year during the first 3 years.

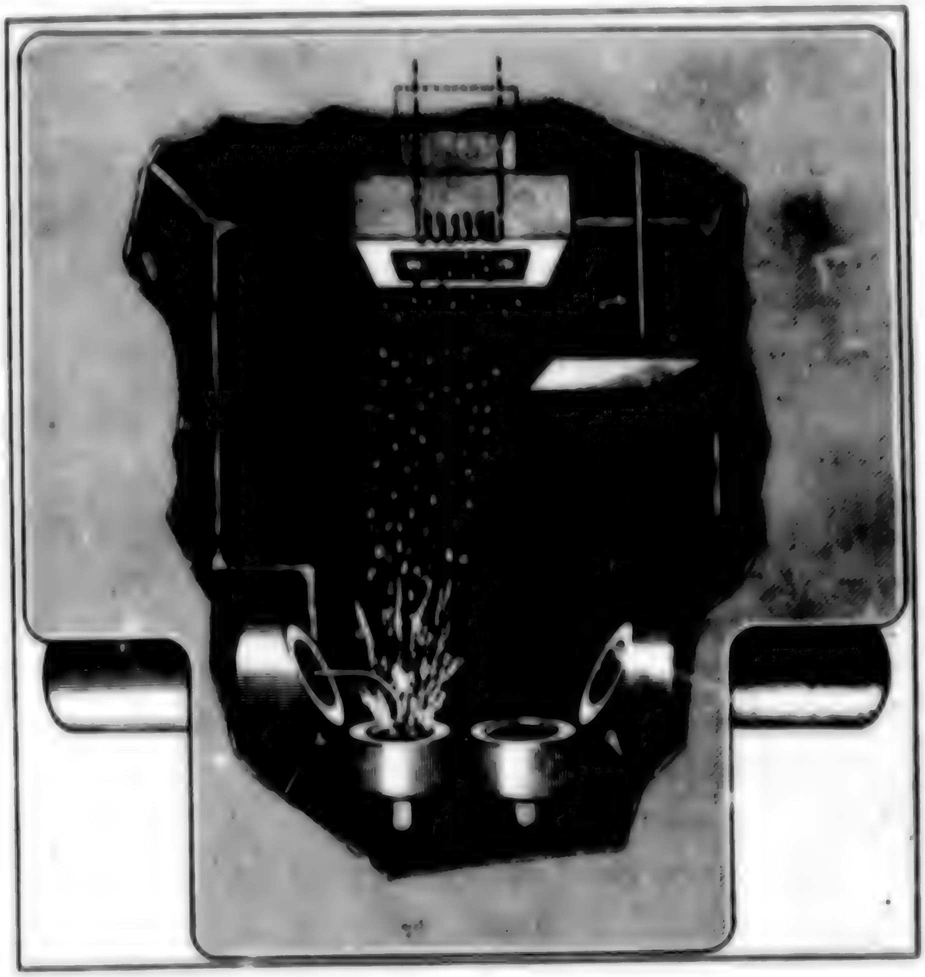
Around 15 researchers are involved, mostly at Chalmers and at the Linkoping Technical University. Researchers in Lulea, Lund, and Uppsala, along with the KTH (Royal Technical University) Institute for Metal Research, the Surface Chemistry Institute, and the Corrosion Institute are involved.

Big Investment

Even though the investment is large by Swedish standards, it is less than what the researchers who started the project wanted. In return, however, the international connections and the relationship with Swedish industry will be extensive. Three researchers and three representatives of industry are on the group's steering committee.

This area is developing very rapidly. This is especially clear from the results of research abroad, which are rapidly disseminated within the industry.

The program will include joint reporting of results and regular conferences for the researchers (with the industry invited), so that applications will be developed rapidly. There is, however, a gap between research and industry that must be bridged.



Vacuum deposition is carried out at 10^{-2} to 10^{-4} Pa. After degassing of the vapor source, the substrate is heated and vaporization begins. When the desired vaporization rate is achieved, the plate is turned to the side and the vaporized material condenses on the substrate (above).

9336
CSO: 3102/220

INDUSTRIAL TECHNOLOGY

FRANCE STILL IN RACE FOR SHARE OF INDUSTRIAL ROBOT MARKET

Paris L'USINE NOUVELLE in French 12 Mar 81 pp 79-81

[Article by Georges Le Gall]

[Text] A start has been made--somewhat late, but still it has been made. From this moment on, the French robot industry is very much alive and rapidly expanding. The ARA research program, under the leadership of the CNRS [National Center for Scientific Research] and the DGRST [General Delegation for Scientific and Technical Research], should permit accelerating the movement and finally produce a surplus trade balance.

Although it had only produced a total number of 200 top-of-the-line robots (for welding, painting and materials handling) between 1978, when it began its activity in this field, and 1980, the Acma Corporation, an affiliate of Renault, will manufacture 150 of these in 1981 alone. Moreover, its line will be expanded with the introduction of small and medium robots. AOIP-Kremlin will produce 40 painting robots as compared with 15 for the entire period of 1979-1980. Afma, which, since its creation in 1976, was only a department of the Adam Corporation (affiliate of Leroy-Somer), has been converted into a separate corporation, Afma-Robots, whose stock is owned equally by Leroy-Somer and La Telemecanique. Afma-Robots, which will have its own factory (now being constructed at Saint-Avertin near Tours) predicts a business volume of 6 million francs for 1981 compared with 3 million francs for Afma in 1980. Climax, a French affiliate of the British group Compair, estimates that its production of manipulators will reach a level of 600 units in 1981 as compared with 300 in 1980.

This proves that the robot industry in France is very much alive and rapidly expanding. It is true that in France, as well as abroad, this is a young industry whose prospects of expansion are brilliant, about 30 percent annual increase of volume during the coming years in Europe as well as in the United States and Japan. But for the moment, the absolute values remain modest: The robot market for 1980 is evaluated at 100 million francs for France, 400 million for the United States and 1 billion for Japan. Here we are simply dealing with orders of magnitude since the statistics in this area are only approximate. Furthermore, classification of robots into six categories (telemanipulators, fixed-sequence manipulators, vairable-sequence manipulators, robots programmable by teaching, robots programmable by numerical control, "intelligent" robots coupled to sensors) has just begun to be recognized internationally by standardization agencies. Under these conditions, the positions of different countries should be evaluated carefully. Keeping this in mind, it appears that France occupies fifth place in the world with regard to the inventory of robots, following Japan, the United States, Sweden and Germany and fourth place with regard to volume produced, trailing Japan, the United States and Sweden and is practically on a par with Germany and Italy.

Very little is known about the field of bottom-of-the-line robots (manipulators) whose prices range from 20,000 to 50,000 francs (there may be approximately 10,000 of these in service within France). There are several reasons for this lack of knowledge. There are the leading manufacturers who, in France, are Sormel (this affiliate of Yema watches, which therefore belongs to the Matra group, has manufactured 1,500 units since 1965), Afma and Climax. However, there are also many small manufacturers. In addition, some companies themselves build the equipment that they require.

French Builders Still Lack References

On the other hand, there are few French manufacturers of top-of-the-line robots (whose prices range from 200,000 to 600,000 francs). These are Acma, AOIP, Languepin (welding robots), Sciaky (also welding robots), CSEE (telemanipulators for heavy Andromat loads constructed in cooperation with the American firm General Electric), La Calhene (affiliate of CEA (the French Atomic Energy Commission) specializing in robots for the nuclear industry). The market for large robots is definitely expanding. However, the primary outlet is still the automobile industry. It is quite revealing that several automobile manufacturers (General Motors, Nissan, Fiat, Volkswagen and Renault) are included in the list of large scale manufactuers of top-of-the-line robots, thus creating captive markets. In France, up to the present time, 80 percent of the Acma robots have been placed in service within the Renault group. Furthermore, the Peugeot group is presently considering an order for approximately 100 robots to be delivered within 3 years.

To be sure, there are already large robots in France operating outside of the automobile industry, particularly in the aeronautics and electrical household appliance industries. Moreover, Acma has conducted conclusive tests dealing with various applications in medium-sized companies such as fastening of cloth to fiberboard, welding of frames for chairs, carts, etc. However, there are still many obstacles to be overcome in order to find customers outside of the automobile industry. These include not only the high price (purchase of a robot is a large investment) but also ignorance of the product by the prospective buyers. Thus, many of them believe that it is sufficient to "hook up" the robot and that it will work all by itself. The fact is that, like all advanced equipment (numerically-controlled machine tools or computers, for example), a robot requires highly skilled personnel to operate it. Finally, before making a decision, the customer would obviously like to have references as well as information regarding the advantages and limitations of installing equipment of this type. However, references with regard to French manufacturers are still few in number, particularly in foreign markets, simply because production of these has begun very recently.

Even in the absence of precise statistics, it may be said that the French balance of trade is negative with respect to robots. Nevertheless, it is conceivable that the situation will soon correct itself. Thus, the manufactuers of manipulators believe that they satisfactorily control their domestic market in spite of the presence of Swiss and German brands (particularly Fells). However, with the exception of Sormel (leading exporter in 1978), they sell very little abroad. Climax has started and Afma-Robots is getting ready to do so. Most of the deficit in the robot balance of trade is attributable to the top-of-the-line variety. It is true that until Acma began manufacturing in 1978, the French market was completely supplied by imports. Except for the 100 telemanipulators built by CSEE since 1974 (of which approximately 50 were exported), French production of top-of-the-line robots barely exceeded 250 units (including 200 Acma, 30 Languepin, 15 AOIP and nine Sciaky). Only 20 units were sold abroad.

Production Will Soon Exceed Consumption

On the other hand, imports, which began to come in during 1970, exceeded 200 units (including 120 for the American firm Unimation, affiliate of General Motors, 45 for the Swedish company Asea and 39 for the Norwegian firm Trallfa. The figures for the American company Cincinnati are not known). This means that approximately half of the French inventory of top-of-the-line robots (which must have amounted to about 450 units in 1980) consists of foreign equipment. Contrary to a widespread impression, it was not in Japan, but in the United States at the beginning of the 1960 decade, that the production of large robots began, particularly by Unimation, which profited from large public appropriations connected with space and aeronautics programs.

To be sure, the Japanese have become the primary producers as well as the primary users of robots. Nevertheless, they scarcely appear on the foreign markets since the demand for these on their domestic market is very high and also since some of their large robots are manufactured under license (Unimation license for Kawasaki and Trallfa license for Kobe) in accordance with agreements that forbid sales outside of Japan. Nevertheless, it appears difficult to believe that the Japanese will stay away very long from international trade in an advanced technology industry which is growing rapidly. At the present time, the Americans and the Scandinavians are the ones who have established international networks and who are developing them. The Unimation plant in Great Britain will produce more than 100 units beginning in 1981 and the deVilbiss Corporation in the United States will be manufacturing robots under the Trallfa license beginning this year.

Nevertheless, France is still in this race. A start has been made--somewhat late, but it has been made. The public authorities have developed the ARA (Advanced automation and robot science) research program which will be conducted from 1980 to 1983 under the leadership of the CNRS and the DGRST. It is reasonable to estimate that French production will soon exceed consumption and that the balance of trade will soon show surplus. Industrial leaders, who know that they must aim at the world market, are drawing conclusions. Thus, AOIP has already established sales affiliates in Great Britain, Germany, Italy, Spain and the United States and expects to export 60 percent of its production beginning in 1981. In October 1980, Renault joined forces with the American company Ransburg in the United States, creating the affiliate (49 percent of the capital belonging to Renault) Cybotech for the purpose of manufacturing a complete line of industrial robots (under Renault license at the beginning) intended to be sold in America, Asia and (the South Sea Islands) Oceania.

Although the production rate of the leading manufacturers is rapidly expanding, it does not yet exceed a few hundred units per year. Unimation produced 600 in 1980 (with a short-term goal of 1,000) while Asea manufactured 300 and soon will be turning out from 750 to 1,000 per year. Acma, which expects to produce 650 units in 1983, is therefore leading the pack. Evidently, the French firms are small businesses. In fact, it is the affiliates of the large groups (Renault, La Telemechanique, Matra, etc.) which are interested in development of all the automatic devices (numerically controlled machines, flexible workshops, etc.). Events are rapidly developing in all of these areas. It will be interesting to make a reappraisal of the French positions during the French exposition and convention to be held by the French Industrial Robot Science Society in Paris during May 1982 which will coincide with the biennial convention of the machine tool industry.

7619
CSO: 3102/216

INDUSTRIAL TECHNOLOGY

AUTO COMPANIES COMPETE IN DEVELOPING FLEXIBLE WORKSHOPS

Paris INDUSTRIES & TECHNIQUES in French 20 Feb 81 pp 7-8

[Article by AP]

[Text] In 2 years, Citroen will have its flexible workshop. It will be installed as part of the Meudon mechanical construction unit, which is already charged with the design and construction of special-purpose and standard machines for the firm.

By June 1983, the Meudon unit will be effecting the automated and flexible production of prototype parts for the firm's new-vehicle design department. Essentially, it will be machining, on a small-production scale, solids inscribable in a 500-mm cube (crankcases, cylinder heads). It will include two digital-controlled-machining control centers, one digital-controlled internal milling cutter,one parts cleaning machine and one measuring machine. The entire setup will be programed to operate 24 hours a day in three 6-person shifts (18 persons total). According to the builder, it should reduce by 30-40 percent the time required to produce prototypes of future models.

The decision is a recent one. The creation of the Automatique Industrielle company dates back only to November 1980. Its capital is held by the Societe General [SG] (40 percent through its subsidiary SG2), Peugeot SA [PSA] (30 percent), Rhone Poulenc (10 percent), and Pechine-Ugine-Kuhlmann Company [PUK] (the remaining 20 percent). The SG, as the majority stockholder, presides it through Mr Lhermite. Big investors are thus committed to finance the required Fr 32 million, of which Fr 19 million will go into plant equipment (the final choice of which has not yet been made). The public treasury has made its contribution: an advance loan of Fr 8 million. Automatique Industrielle will thus be a marketing subsidiary. Its potential customers include: Peugeot motorcycles (for the manufacture of light-motorcycle crankcases) and Thomson. A second flexible workshop, belonging entirely to Citroen, will be installed in the Saint-Etienne plant. It will fabricate standard components for machines. Some 20 persons have been in place since the beginning of the year to carry out all these projects.

For the moment, Citroen has no ambitious robotics plans, and if there be some robots involved, they will not be built in-house. Rather, Automatique

Industrielle will perform an engineering function, bringing together equipment from all manufacturers. In this field, the experience of the Caterpillar flexible workshop near Grenoble will be highly useful.

The same is true in regard to the simulation and programing aspects. The Quai de Javel firm will have to seek the help of certain university groups (and especially the CERT [Toulouse Studies and Research Center]) that have already taken part in the Renault project. Talks to this end have been held very recently. The setup will also be equipped with a system for spotting broken or worn tools and, probably, for automatic identification of the parts involved.

Actually, at present, this project does not appear to be real-time-guided operation for an entire family of parts. Rather, it is a piece-by-piece-programed machining cycle operation. This explains the relatively large number of persons involved with respect to the number of machines. The timetable is tight. Between now and June, the equipment (French?) must be chosen and detailed plans submitted to the CODIS [Committee for Strategic Industries Developmental Guidelines], which has already given its agreement in principle. The competition that has been scrupulously maintained between the PSA and the state-controlled enterprise is now being fought on the terrain of flexible workshops. The head of technology at Citroen is moreover a former employee of Renault. Going beyond this "rivalry" between the two firms--actually more a commercial than a technical one--a comparison between Citroen's Meudon project and Renault's Boutheon project is unavoidable. Citroen has opted for the fabrication of prototype parts (very small, very diversified runs). Renault has opted for standard components (medium, moderately diversified runs). Citroen's announced budget is Fr 32 million (design costs included). Renault's is said to be Fr 40 million. The latter's Boutheon workshop, currently in its final stage of completion, includes some 10 (versus 3) machine tools, for a production of the order of 250 pieces daily, and appears decidedly more ambitious. If the announced figures and objectives are to be taken with the customary grain of caution, the two projects are surprisingly complementary. The prelude to joint action?...

9399
CSO: 3102/198

ELF-AQUITAINE DEVELOPS DEEP-WATER ROBOT

Paris AFP SCIENCES in French 19 Feb 81 pp 20-21

[Text] Libreville--The Elf-Aquitaine group has brought to a successful conclusion the development of an underwater robot that opens the way to the exploitation of oil and natural gas at great depths.

The test run undergone by "TIM" [Trouble-Shooting and Maintenance Manipulator] completes the last stage of testing, at a depth of 60 meters at the Grondin offshore deposit (150 km south of Libreville) of an automatic underwater production platform capable of operating at ocean depths down to 1,000 meters.

The significance of this program is vast. Sedimentary basins capable of entrapping hydrocarbons extend great distances offshore, and probable offshore reserves are immense.

Until now, the oil companies have tiptoed out from shore, so to speak, making use of tried and tested dry-land techniques. From the first drillings at a seabed depth of 10 meters to the recent Cognac platform (Gulf of Mexico), each of whose metallic columns exceeds the height of the Eiffel Tower by a head, the principle has remained unchanged: the production installations, in steel or concrete, are in air and rest on the ocean bottom. This is essentially for reasons of safety.

The "wellhead," which regulates the flow of the "oil" and provides access to the interior of the well must be accessible at all times during the 10- to 20-year usual exploitable lifetime of a well. Moreover, the liaison between the surface and the bottom of the well must remain fully intact.

For production at water depths of 200-300 meters, however, the use of an underwater platform appears to be the sole means of anchoring the operation, with the added difficulty involved that the installation becomes inaccessible to divers. It is in this respect that Elf-Aquitaine appears to have taken a giant step forward.

In 1974, the group launched an underwater platform project, the final development cost of which would be Fr 300 million. Since 1976, three directional wells have been drilled side by side northeast of the Grondin field and capped by a platform equipped with three underwater wellheads and a control unit.

Instructions issued from a surface installation are transmitted via an electrical cable to the control unit, which regulates the flow from each well by means of conventional hydraulic vanes. The control unit also operates monitoring equipment, such as pollution sensors and bore sand-up sensors.

The overall design, which is relatively simple technically and hence reliable, enables the carrying out of usual operations not requiring the bringing down of equipment from the surface.

For more complex operations, particularly those requiring equipment to be brought down, a mobile, powerful, precise "tool" capable of working without time or environmental constraints was needed. "TIM," the robot designed by Elf-Aquitaine's researchers, has been working at Grondin Northeast since 1979. Built by MATRA [Mechanics, Aviation and Traction Company] and the workshops and shipyards of Brittany (Nantes), it cost Fr 20 million to develop.

Equipped with two telescoping arms terminating in pincers and with a crane that can move 1.5 tons, TIM "sees," thanks to 5 video cameras and 10 projectors. The entire assembly (12 tons with its supporting carriage) is "parachuted" down, as needed, from the monitoring barge on which it is normally kept, and guided toward the platform by two tensed cables. Once "in position" on the two rails that run the entire length of the platform, TIM is ready to go to work.

Aboard the barge, TIM's "pilot," seated comfortably and dry at his control console, "manipulates," smoothly and effortlessly, loads of 100 kg at 600-meter depths, using the images displayed to him by 5 television screens. With TIM, he can also, just as easily, effect oil, water or electrical connections.

After 18 months of test running and adjustments, TIM will soon be returning to France. "All planned operations have been carried out," says Mr Francois Bernard, director of research and production at Elf-Aquitaine, who is also the "father" of the underwater station and its robot. "We now know it works."

Two applications in Norway are scheduled to add to the experience acquired in Gabon. In the North Sea, the French group decided last May to exploit, northeast of Norway's Frigg field, a satellite deposit of 14 billion m^3 of natural gas by means of an underwater platform installed at a depth of 100 meters. By way of innovation, the installation, which will be easily monitored by means of a small surface platform, will be equipped with a device enabling it to "kill" the well by remote control. Drillings are scheduled to start in September 1981 and production in 1984.

Still in Norway, the "SKULD" (a Norwegian mythological figure symbolizing "the Future and Need") project, provides for the production of natural gas by means of an underwater platform installed, this time, 20 km away from an open-air platform. The installation will be radio-controlled by means of a surface beacon.

For Elf-Aquitaine, the advancement of underwater platform operations from the experimental to the industrial stage responds, above all, to the need to exploit its own deposits. But the fact cannot be overlooked that between 1975 and 1981, worldwide orders for wellheads rose from some 10 to some 50 units per year.

9399
CSO: 3102/200

SCIENCE POLICY

MINISTER DISCUSSES FRANCE'S PLACE IN OCEAN ENERGY RESEARCH

Paris AFP SCIENCES in French 19 Feb 81 p 22

[Text] Paris--According to a statement by Minister of Industry Andre Giraud, made in response to a deputy and appearing in the 16 February 1981 issue of the JOURNAL OFFICIEL, the only country in the world exploiting ocean energy industrially is France, with its Rance tidal power station.

Concerning Ocean Thermal Energy Conversion [OTEC], Mr Giraud stated that the only countries carrying on significant research are, on the one hand, the United States and Japan, both of which possess favorable sites for the installation of high-power (10 to 100 MW(E)) OTEC plants on their own territory, and, on the other hand, France, whose only suitable sites are located in its overseas departments and overseas territories. The USSR, the FRG and the United Kingdom are totally absent from this field of research. In France, the OTEC portfolio, drawn up in 1956, was reopened in 1978 at the initiative of the CNEXO [National Center for the Exploitation of the Oceans], and this year the first phase of the program is to be completed. This phase has consisted of three studies: a comparative site study, a technical feasibility study of closed-cycle terrestrial plants as well as of open-cyclefloating plants, and an economic study. The decision to launch the technological phase is currently under study; it will depend upon the position of French industrialists, which has not been defined as yet.

As regards wave energy conversion, the United Kingdom and Japan have taken the uncontested lead, Mr Giraud indicated. The efforts of these two countries, however, are being confronted by a number of difficulties. For the United Kingdom, which launched its program, estimated to cost 3 million pounds (Fr 30 million), in 1974, wave energy conversion was to be the priority aspect of its research and development program on renewable energy sources, but a report dated in 1979 finds the program faced by "hard realities." Thus, this document finds that, for the first generations of prototypes, currently under study, the price per kWh will be 10 to 20 times higher than that for energy supplied by conventional or nuclear power plants.

Insofar as concerns tidal energy conversion, the Mont-Saint-Michel bay site offers very favorable characteristics for the installation of a large-scale plant. Currently, the EDF [French Electric [Power] Company] is continuing its studies to remove initial doubts, especially as regards the environment, but it is still too early to anticipate the results since the work will take several years to complete.

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ITALIAN CIVIL AVIATION INDUSTRY GAINS NEW IMPETUS

Progress To-Date Recounted

Paris AVIATION MAGAZINE INTERNATIONAL in French 1-15 Apr 81 pp 34-37

[Article: "Second Wind for Civil Programs"]

[Text] Italy entered the field of airline jumbo jets with the signing of the Aeritalia-Boeing agreement of 1971 which, after various revisions, has finally resulted in the present B-767 program. Thus a long chapter, unfinished since the end of World War II, was successfully concluded.

As a matter of fact, until then all activity was limited to the role of subcontractor for foreign aircraft manufacturers, although often at a high technological level. Such was the case with Italian participation in the "Concorde" and "Mercure"; for the latter there were highly advanced solutions for problems of structure and fabrication.

To a great extent activity of this type has indeed enabled Italy to preserve, and improve, its manufacturing and technological capabilities. Other contracts confirm this, like those related to production of fuselage and tail components for the DC-9 and DC-10 by Aeritalia. In this connection McDonnell Douglas recently characterized Aeritalia as its best foreign supplier because of the quality of its workmanship.

As far as studies themselves are concerned, even during the years in which original work was interrupted, Italian technicians were able to keep a hand in the business, thanks to Breda 308 and Augusta AZ.8, and then the G.222 military transport twin turboprop prototypes. In this perspective this latter, comparable in more ways than one to a civil aircraft, played a very important role in preserving independent development capabilities.

These capabilities contributed greatly to the B-767. An Aeritalia team played an important role in its definition and an Italian engineer, Steve Ruocco, for example, exploited the Coanda effect to improve the lift of that airplane's wings. This work, related to one of the intermediate projects which preceded the present B-767 design, was used by Boeing during development of the YC-14 military transport.

It is also Aeritalia, through its transport aircraft unit, which was behind the only other Italian civil program, in the field of airliners. Involved, of course, was the study of a 40-seat airplane intended for commuter service, which was the subject of a cooperation agreement with Airospatiale [National Aerospace Manufacturing Company]. The AIT.230 project has evolved and its latest configuration, with T-shaped tail, is designated the 208.

The end result may be a joint program combining the AIT.230/208 and the French AS.35 project, which in the meantime has become the ATR.42; both, incidentally, are greatly similar. The agreement signed by the two companies relating to a feasibility study expired last 31 December and since then has been extended for 6 months. In the meantime the Italian aeronautical industry is hoping to be able to obtain the desired financial aid, a necessary condition to its continued participation.

The two companies are still seeking a third partner to enable the establishment of European initiative in the American marketplace. It seems that Piper, which is showing the greatest interest in this project, is considered among the most promising in the category of new commuter aircraft.

Last year the portfolio of subcontracts, in the field of airliners, from which Italy is benefiting, was enlarged by the first contract awarded by the Airbus Industrial consortium, this through its German branch, Deutsche Airbus. Several companies whose work is being coordinated by Aeritalia--which will not necessarily participate in the mass production, properly speaking--are responsible for a number of components forming the rear cone of the fuselage common to the A-300-600 and A-310 (see AVIATION MAGAZINE INTERNATIONAL No 794 p 13).

This contract, which will represent a total of 250,000 direct man-hours annually, obtained at the conclusion of particularly laborious negotiations, is perhaps not quite as important as hoped in Italy. That at least is what observers are affirming, stating that it was necessary to talk of economic compensations at the very moment that the national airline, Alitalia, had opened negotiations looking toward the purchase of its first Airbus A-300 airplanes.

PHOTO CAPTION

All technological, aerodynamic, and structural aspects of the Boeing B-767 benefit in one way or another from Italian contributions; in particular the moving parts of the leading edge and trailing edge of the wing, the moving parts of the horizontal stabilizers, the tip of the nose, the keel, and the rudder include carbon fiber. The rudder, 6 meters high, is to this day the largest piece made of composite material in the world.

Engines: Only One National Program

Paris AVIATION MAGAZINE INTERNATIONAL in French 1-15 Apr 81 p 35

> [Text] In the field of autonomous propulsion programs Italy has been somewhat marking time. But, far from having abandoned them, it has continued to produce foreign engines under license, which has enabled it to maintain its technological competence up to date and to expand a number of specialties. The latter involve, more specifically, hot turbine components, reduction gear boxes, and adapting of large jet engines for naval use.

The RB.199, which is the propulsion plant of the "Tornado," was the object of important studies and development work since Fiat Aviazione was alongside MTU and Rolls-Royce within the Turbo-Union consortium, with responsibility for study and production of the turbine and low pressure shaft, the diffuser, and variable geometry nozzle.

The experience then acquired enabled Fiat Aviazone, among other things, to collaborate with Rolls-Royce to define the Mk.807 version of the "Spey," intended for the new AM-X fighter aircraft and which will be produced in Italy with participation by Alfa Romeo Avio.

In the civil sector Fiat and Alfa Romeo are working with Pratt and Whitney and General Electric, respectively. In the first case there is participation in the PW 2037, Fiat being responsible for the accessories control gear box, the oil reservoir, and various other components. For its part Alfa Romeo had obtained participation, amounting to 4 to 5 percent, in the CF6-32, recently abandoned. But the engine manufacturer has, notably, secured transfer of this role (to the extent of 5 percent) to the General Electric CF6-80 program.

Alfa Romeo, incidentally, is responsible for the only totally Italian aeronautical engine, now under development: the AR-318, a turbine of 600 shaft horsepower, the result of an association with Rolls-Royce and which now depends solely upon the Naples company. Seven prototypes have been built and final development is now under way.

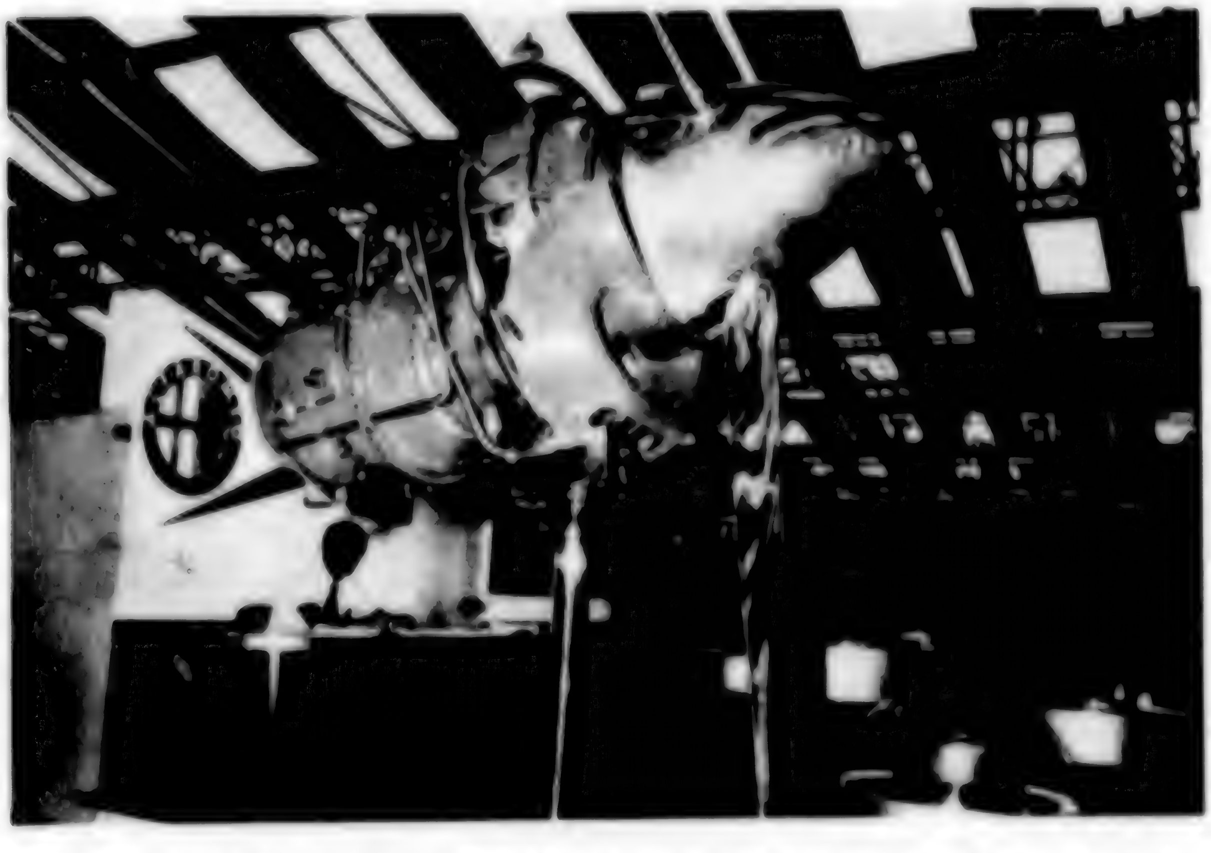
The basic version of this engine is aimed particularly at propulsion of heavy general aviation aircraft, or further, of commuter aircraft of 20-seat capacity. Another version, also with 600-horsepower output, adapted to acrobatics, is being proposed for propulsion of single-engine trainers. Lastly an AR.318, downrated to 400 horsepower, will be built for private aviation or, further, for aircraft for agricultural purposes.

An adaptation for helicopters is also contemplated, as well as use in industrial and ground tractive applications Alfa Romeo has considerable experience, especially because of production under license of the General Electric T700, an aircraft version of which, the CT7, is now in existence. Previously, the company has produced, completely or partially, numerous models of small turbines.

For its part Fiat Aviazione has carved out for itself a very particular specialty, that is development of industrial energy generating versions of aeronautical turbines, on the one hand, and versions for naval purposes on the other. In the former case a preliminary balance sheet shows installations realized in eight foreign countries. In the latter, there are 12 navies which have ordered a total of 50 LM.2500 units derived from the CF6 and the LM500 derived from the TF34. Fiat also supplies navalization elements for turbines sold directly by General Electric.

The engine division of Rinaldo Piaggio is limited to production under license, complete with adaptations and updating the turbines which emerge from its shops; the Rolls-Royce "Viper" and Lycoming T53 and T55. Recently Piaggo signed the agreement which will permit it to produce, under license, the Rolls-Royce "Gem" that will provide the propulsion of the new Agusta A.129 "Mangusta." helicopter.

Last, it is appropriate to mention mechanical transmissions: Fiat Aviazione has studied and produced the reducers for the major portion of Aerospatiale helicopters, including 90 "Dauphin" 11N destined for the American Coast Guard, the "Gazelle," "Puma," and "Super Puma," as well as for the two versions of the "Ecureuil." The company also produces accessory control gear boxes intended for all the CF6 units produced by General Electric and SNECMA [National Aircraft Engine Study and Manufacturing Company].



Here, photographed at Farnborough, is the only Italian national engine, the Alfa Romeo AR.318 of 600 horsepower, study of which had been commenced in co-operation with Rolls-Royce. Subsequently, various versions are contemplated in coming years: for business aviation, tourism, and commuter traffic, with power adapted to different types of aircraft.

Helicopters: Functioning as General Contractors

Paris AVIATION MAGAZINE INTERNATIONAL in French 1-15 Apr 81 pp 36-37

> [Text] In the field of rotating wing aircraft Italy occupies an enviable position: its production is second only to that of France and therefore is at a proportionately high level in a European context. Moreover, Italy has independent capabilities for study and development. Its helicopter activities are carried out by the Agusta Group (EFIM) alongside Breda Nardi.

Agusta entered this field as a Bell licensee, then quickly bridged a first stage by developing new versions of equipment of American origin, to arrive in the end at development of aircraft of its own design, the most typical undoubtedly being the A.106 for antisubmarine warfare and the AZ.101 tri-turbine transport.

The activities of Agusta next were broadened with the acquisition of licenses from Sikorsky (SH-3D and HH-3F) and Boeing-Vertol (CH-47C) and then by absorbing the SIAI-Marchetti vertical flight division. Today the Agusta group alone accounts for a quarter of all the employees in the Italian aeronautical industry with more than 9,000 out of a total of about 40,000.

Better yet, on the basis of 1979 statistics, the latest available, the business volume amounted to 430 billion lire (out of 1,100 billion for the entire sector) and the group realized two-thirds of all Italian aeronautical exports. Three companies of the group are contributing to such results: SIAI-Marchetti, Elicotteri Meridionale, and IAM. Moreover, large investments are in the works (mainly in the southern part of the country) which are related to research, beginning with composite materials technology.

The twin turbine A-109 "Hirundo" is the first mass-produced helicopter wholly of Italian design. It stands among the first helicopters of the new generation which are pointed principally at the civil market and it is the world's first to be certificated for IFR [instrument flight rules] operation with only a single pilot on board. Various military versions are also being developed.

Important export successes have already been achieved. Thus, for example, the Hirundo" has been adopted by the new company which acts as a liaison between the various New York airports. Penetration into the American market should be facilitated by the establishment of the Agusta Aviation Corporation subsidiary in Houston at the same time as two maintenance centres, one at Conroe, Texas and the other at Philadelphia.

Agusta has also established representation in other parts of the world, notably at Stockholm, to cover northern Europe. At the same time other versions of the "Hirundo" have been announced, beginning with the A.109B more specifically intended for off-shore petroleum operations. In the meantime the studies office is working on an attack helicopter, the A.129 "Mangusta," which has reached the mock-up stage; the mock-up will be shown at the Le Bourget Salon. It is hoped that it will offer an alternative to heavier and more complex helicopters; it is said to have already aroused the interest of several general staffs.

It is a twin turbine which will fly in the spring of 1982, and the first mass-produced units will be received by the Italian army during the following year. Proposed with either the Rolls-Royce "gem" or Lycoming engines this helicopter, characterized by minimal frontal surface, will be equipped with advanced avionics, including the MUX multiplexing system, capability of night vision and navigation, etc.

Another important program: the EH.101 intended for antisubmarine warfare and is to succeed the "Sea King" units of the British and Italian navies. This initiative is based upon an agreement between the two governments and establishment of the European Helicopter Industries firm in which Agusta and Westland will be equal partners. The door remains open for eventual participation by France and West Germany.

The tri-turbine EH.101 helicopter is subject to civil development and, without counting the American market, the prospect of selling at least 1,000 units in 15 years is already being advanced. Last, still under the heading of international collaboration, it is appropriate to emphasize that the agreement relating to the Bell 412 goes beyond the scope of a simple license but rather implies active Italian participation, symbolic of Italian technical maturity in the field of rotating wing aircraft.

For its part Breda Nardi has been continuing to produce the Hughes 300 and 500 for several years. The construction of a large plant at Monteprandone has made it possible to go beyond the stage of component fabrication and simple assembly to complete production, including the new NH.500D version. Great successes have been achieved in Italy and in the Near East market.

The twin turbine A.109 "Hirundo" is the first helicopter of wholly Italian design to be mass produced.

Shown above is a mock-up of the A.129 "Mangusta" light antitank helicopter now in the course of manufacture. Let us recall that the first flight of prototype No 1 is planned for the beginning of 1982.

Shown above is an artist's rendering of the tri-turbine EH.101 helicopter which will be developed by the European Helicopter Industries in which Agusta and Westland will be 50-50 partners. (AVIATION MAGAZINE INTERNATIONAL No 786 p 15).

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18 May 1981